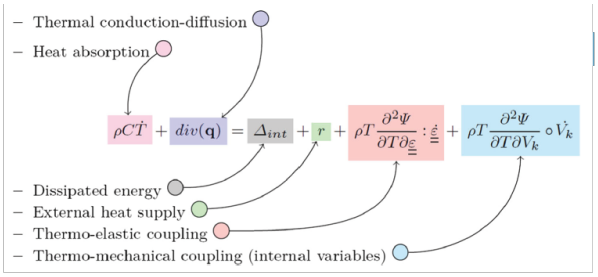
Energy based

ENERGY CALCULATIONS
Dissipated energy Δ^*

- The aim is to relate temperature field to the dissipated energy which required heat-equation that is presented in the right;
- It is important to highlight that the approach is based on the evaluation of the dissipated energy per cycle, and not directly on temperature;



Evolution along time

Thermal exchange and diffusion

Intrinsic dissipation

Reflection from external sources

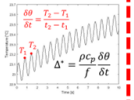
Couplings between V_k and the Temperature

Thermo-elastic couplings

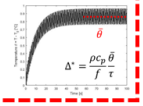
Hypothesis

Temperature rise is low enough to consider ρ *and* C as constants

Reduced equation, $\Delta^* = \frac{\rho c_p}{f}\frac{\delta\theta}{\delta t}$



Reduced equation for stabilized temperature, $\Delta^* = \frac{\rho c_p}{f}\frac{\bar{\theta}}{\tau}$



External heat supply is not time dependent

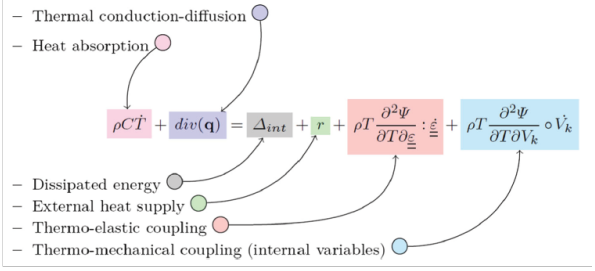
$\theta = T - T_0$ T_0 *: initial temperature*

Temperature variations are low enough to neglect couplings of internal variables to the temperature

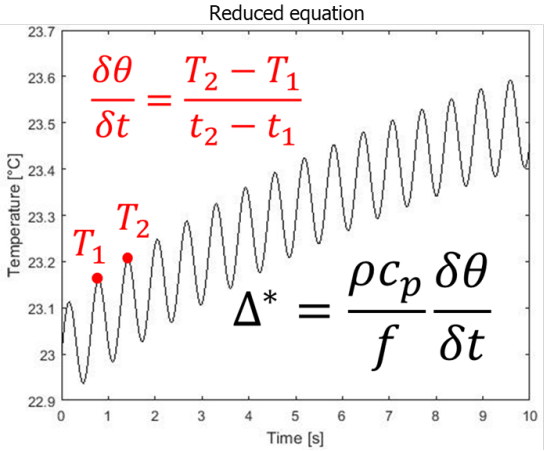
The thermo-elastic couplings terms compensate over a cycle *(a mechanical cycle is a thermomechanical cycle)*

ENERGY CALCULATIONS
Dissipated energy Δ^*

- The aim is to relate temperature field to the dissipated energy which required heat-equation that is presented in the right;
- It is important to highlight that the approach is based on the evaluation of the dissipated energy per cycle, and not directly on temperature;



Reduced equation



Reduced equation for stabilized temperature